

Buried Heterostructure for Lasers and Light Emitting Diodes**ABSTRACT**

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A laser diode that is constructed in a trench in a manner such that the material in the trench acts as a waveguide. The laser diode includes a first contact layer constructed from a first semiconducting material of a first carrier type, the first semiconducting material having a first index of refraction. The first contact layer has a trench therein. The trench has a layer of a second semiconducting material of the first carrier type on the bottom surface. The index of refraction of the second semiconducting material is at least one percent greater than the index of refraction of the first semiconducting material. The laser also includes a first dielectric layer covering the first layer in those regions outside of the trench and a first cladding layer constructed from a third semiconducting material of the first carrier type. The first cladding layer overlies the dielectric layer. An active layer overlies the first cladding layer. A second cladding layer constructed from a fourth semiconducting material of the opposite carrier type from the first carrier type overlies the active layer. A second contact layer of a fifth semiconducting material of the opposite carrier type from the first carrier type overlies the second cladding layer. The invention is particularly well suited for constructing laser diodes based on group III-V material systems such as GaN.

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